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COMPLETE SPECIFICATION

Improvements in and relating to a Filtering Medium for use in Brewing Beverages

I, PHILLIP PERCY SPISELMAN, a citizen of the United States of America, of 3083 Grand Avenue, Baldwin, New York, United States of America, formerly of 1818 Ocean Avenue, Brooklyn, New York, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an improved method for coffee-making, apparatus therefore, and in particular, to improved filter media.

There has long existed a need for a truly satisfactory filter type coffee-making apparatus.

Partial solutions to this problem include coffee brewers of the type wherein a receptacle is provided to which is added a mixture of comminuted coffee bean and hot water. A filter means which may be a perforated metal ceramic, or cloth strainer, is usually provided for the purpose of separating the coffee bean particles from the liquid which is caught in a collection container. One of the undesirable features of this prior apparatus is that the container becomes soiled with coffee and necessitates a rather messy cleaning operation. A further improvement in the art was the introduction of a paper filter which solved the cleaning problem.

In using the paper filter it is customary to form it into a cone which is in turn supported in a funnel. Comminuted coffee bean and hot water are added and the extracted coffee solution immediately filters through to a collection vessel. When the filtrate has passed through the filter the paper cone may be removed together with the coffee residue and discarded.

The two types of prior art devices discussed have a common deficiency in that the hot water begins to run through the filter before the soluble coffee has been extracted from the comminuted coffee bean. If the filtrate were to be critically examined it would be noted that at first the filtrate is almost water white. In order to obtain a filtrate of sufficient strength it is therefore necessary to use an excessive quantity of coffee bean so that the final portion of filtrate is sufficiently concentrated to bring the average strength of the coffee extract to a proper level for consumption or else recirculate the filtrate. Attempts to solve this problem by using paper of low porosity so as to obtain a slow filtering rate were unsuccessful. Paper having fine pores tend to become clogged by the finely divided particles of coffee bean. In general, excessive filtering time is objected to by the consumer.

This invention provides filter media having a deferred filtering period, that is to say filters having substantially zero porosity for an initial period sufficient for the soluble coffee to be extracted from the comminuted bean by hot water. After the initial period the filtrate is permitted to flow freely. Since the entire portion of water is available to serve as a leaching agent during said deferred period, the overall leaching time may be reduced. This factor permits the employment of a highly porous membrane and avoids the earlier discussed objections of low porosity filters.

An object of this invention is to provide filter media having deferred filtration periods.

A particular object of this invention is to provide non-porous filter media which may be rendered porous by treatment with a brewed beverage.

A further object of this invention is to provide filter media bearing a coating of a water soluble material so as to render said filter paper non-porous for a predetermined period after being subjected to hot water.

An object of this invention is to provide an improved filter medium having an imper-

meable surface coating consisting of a plurality of layers of water soluble materials.

Another and particular object of this invention is to provide an economical method f brewing coffee.

A still different object of this invention is to provide a means for conveniently introducing additives to coffee brews.

According to the present invention, a filter medium for use in brewing beverages is characterized by said filter medium being substantially non-porous until said filter is subjected to the action of the brewed beverage.

Preferably, the filter comprises a normally porous sheet coated with a thin layer of an edible water soluble material.

According to the present invention, a method of brewing coffee comprises the steps of adding comminuted coffee bean to a container including a filter member coated with a thin layer of an edible water soluble agent so that said filter member is non-porous, adding hot water to said container, dissolving a water soluble constituent from said coffee bean, dissolving said water soluble agent so as to render said filter member porous, and collecting the resulting filtrate.

The various features of the invention will now be described and illustrated by way of example, with reference to the accompanying drawing in which:

Fig. 1 is a cross-sectional view of a section of filter media of this invention.

Figs. 2 and 3 are cross-sectional views of sections of still other embodiments of filter media of this invention.

Fig. 4 is a cross-sectional view of a section of still another embodiment of filter media of this invention.

Briefly stated, this invention provides filter media which are rendered but temporarily impermeable by the coating of the porous media with a water soluble film or by compacting the surface to provide a surface which is water impermeable until it is swollen by the action of the water.

In carrying out this invention I prefer to employ a highly porous filter paper.

This porous paper is then tub-sized with a fairly viscous solution of a water soluble agent. By "tub-sized" is meant passing the paper through a vessel containing the agent so that it picks up a coating. The coating is then dried. A viscous solution is preferred over a thin solution as absorption by the paper is minimized. If spray or other coating methods are employed then less viscous solutions are suitable.

Suitable coating materials need be nontoxic, free from objectionable color, odor or taste, and stable under ordinary conditions of storage and use. Additionally it should be cheap, economical, readily available, not subject to insect infestation, easy to handle, having good film-f rming characteristics and adhesive strength.

Materials meeting the aforementioned requirements include, but are not limited to, the following: sodium carboxy methyl cellulose, starch, glucose, methyl cellulose, gum tragacanth, guar gum, gum arabic, locust bean gum, polyvinyl alchohol, water soluble casein, solid paraffin and/or compatible mixtures thereof.

Two distinct water soluble layers 12 and 13 are provided for filter paper 14 as shown in Fig. 1. This provides a considerable time delay to the passage of a liquid through the filter even if highly soluble materials are employed as both coatings need be dissolved before the filtrate begins to pass through the filter paper.

If it is desired to coat but one side of the filter medium 14 the water soluble coating 12 may be applied by conventional spraying or doctor blade techniques. This embodiment is shown in Fig. 2.

Additional time delays may be obtained by further coating the side of the paper which will be exposed to the water with an additional coating 15 of a water soluble material meeting the earlier mentioned standards. It is preferred to use for coating 15 a less soluble material than for coating 13. Coating 15 is preferably applied by spraying or doctor blade techniques.

In Fig. 4 another embodiment of this invention is disclosed wherein a smooth surfaced paper 16 is processed as by calendering or mechanically polishing with a smooth surfaced rotating stone wheel so as to physically close the surface pores. When hot water is poured onto the filter paper, the paper swells reopening the closed pores of the compacted surface 17. Thus a time delay is built into the filter paper which permits the hot water time to leach the water soluble components out of the comminuted coffee bean. For this purpose a creped surface paper should not be employed although highly satisfactory for the coated embodiment of this invention. The same effect may be obtained by "shot-peening" the surface of the paper. By "shot-peening" is meant repeatedly impacting the surface with small hard particles which may be given velocity by an air stream or by a vibrating table.

The flavor of coffee may be modified by the addition of crushed eggshell to the ground coffee bean. The filter media of this invention provide a convenient method of introducing the eggshell as disclosed in Example 5. In this example, finely crushed eggshell was dispersed in the coating material. When the coating is dissolved, the eggshell is present to perform its functions. In a like matter other additives such as chicory may be introduced into the filter medium thus simplifying for the housewife the task

f brewing coffee.

One of the objects of this inventi n, as has been earlier p inted out, is to provide an economical method of brewing coffee. With this bject in mind the vari us examples, in general, use a minimum quantity of coffee and therefore inherently require the efficient extraction of the s luble fraction from the coffee bean for satisfactory results. Empirically, I have found that ten to twelve minutes of leaching time is the maximum allowable based on practical considerations. Accordingly, a sufficient amount of comminuted coffee bean has been employed consistent with this time, except in Example 4 where 50% more coffee is used so as to permit a satisfactory brew in only five minutes of filtering time.

Filter papers used in the chemical field are carefully cataloged as to porosity and retentive qualities. In the following examples a few such papers are specifically mentioned. It is to be understood that the composition of the paper is not essential to the invention provided it is porous, has reasonable wet strength, is free from usual additives such as alum, is neutral and relatively mineral-free. In general, the papers may be smooth or crepe surfaced. There is described hereinafter a preferred paper but it is to be clearly understood that other filter media may be employed.

Characteristics of preferred papers:

1. Fiber composition—consists of chemical wood fiber and rag fiber (no ground wood present).

2. Basis weight—47.5 lbs./500—25″ × 40″ sheets.

3. Bulking factor—creped surface 0.127″/10 sheets. Bulking factor—smooth surface 0.07″/10 sheets.

4. Air permeability (Gurley test) 1 sec./100 cc air/sheet.

5. Water absorption (Tappi* test 432) 17 sec.

6. Tear resistance—7 grams of force required to tear one sheet.

7. Bursting strength—16 points Mullen.

8. PH—6.6.

9. Mineral content (ash)—.15%.

**Tappi*—Technical Association Paper and Pulp Industry.

Example 1—a sheet of the above described preferred creped paper was coated having the characteristics given earlier with 10.7 milligrams of methyl cellulose having a viscosity of 100 c.p.s. The methyl cellulose was dissolved to form a 0.089% solution. 12. c.c. of the solution was spread upon a glass tabletop and soaked up by the paper. The paper was placed on a plastic screen and allowed to dry.

The paper was formed into a cone and mounted in a filtering funnel. Three ounces by volume of finely comminuted coffee bean, comm nly called "drip grind" was added to the cone followed by 24 ounces by volume of boiling water.

After 10 seconds the first drop of filtrate appeared. The dripping continued at an increasing rate until after 120 seconds a thin steady stream was maintained. After 15 minutes filtering was complete. The coffee was tasted and found to be of excellent quality.

Example 2—The experiment of Example 1 was repeated with the same untreated paper. The filtrate appeared immediately. Filtering was complete in 3 minutes. The filtrate was unsatisfactory as coffee.

Example 3—Example 1 was repeated using 210 mg. of gum tragacanth deposited from 20 cc. of a 10% aqueous solution.

Filtering action was noted 12 seconds later, with a full stream developing after 2 minutes. Filtering was completed in 12 minutes. The coffee was very good.

Example 4—The procedure of Example 1 was followed using 400 milligrams of guar gum (edible grade) which was deposited from a 1.5% by weight, aqueous solution. 50% more coffee (4½ ounces) was employed than in Example 1.

Filtering began in 10 seconds developing to a steady, but medium, stream in 60 seconds. Filtering was complete in five minutes. The coffee was of good color and taste.

Example 5—The procedure of Example 1 was repeated with one gram of finely crushed eggshell having an average particle size of approximately 200 mesh dispersed in the coating material.

No effect on filtering time was noted. The flavor of the coffee was excellent.

Example 6—The procedure of Example 1 was repeated using 51 mg. of sodium carboxy methyl cellulose deposited from a 0.5% aqueous solution.

The filtrate appeared in 10 seconds, after 60 seconds a thin steady stream appeared. Filtering was complete in 11 minutes. The coffee was excellent.

Example 7—The procedure of Example 1 was repeated using 2100 mg. of polyvinyl alcohol (DuPont "Elvanol" Registered Trade Mark 72—60) deposited from an 8% aqueous solution.

The filtrate appeared in 27 seconds, after 180 seconds a thick steady stream appeared. Filtering was complete in 7 minutes. The coffee was excellent.

Example 8—The procedure of Example 1 was repeated using 450 mg. of locust bean gum deposited from a 1.5% aqueous solution.

The filtrate appeared in 25 seconds, after 90 seconds a thin steady stream appeared. Filtering was complete in 12 minutes. The coffee was excellent.

Example 9—The filter cone was prepared as in Example 1. Two ounces of tea leaves and 24 ounces of boiling water were added. The filtering time was comparable to that of Example 1. The tea was of excellent color and taste.

Example 10—A filter paper was prepared as in Example 4. Then 5 mg. of methyl cellulose was deposited on one side by spraying a .08% aqueous solution by weight. Only 3 oz. of coffee were used.

When tested the first drop of filtrate appeared in 90 seconds and filtering was complete in 6 minutes. The filtrate was of excellent color and taste. This shows the advantage of the deferred filtering period.

Example 11—A smooth surface filter paper of close texture and medium filtering speed which was supplied by the Eaton-Dikeman Co. of Mt. Holly Springs, Pennsylvania under their number 952 was folded to fit a standard 60° funnel. 250 c.c. of boiling water was added to 15 grams of finely divided coffee. Filtering began immediately and was substantially finished in three minutes. The coffee filtrate was very light in color. It required two successive passes of the filtrate over the coffee before the coffee extract was sufficiently concentrated.

Example 12—A second sheet of the same paper as used in Example 11 was surface polished by ironing with a steam iron to close surface pores. The coffee brewing procedure was repeated. A few drops of filtrate did appear after ten seconds. The rate increased gradually so that after one minute a steady stream of filtrate was passing through the filter. The total filtering time was 8 minutes and the filtrate was of suitable strength.

Example 13—Example 1 was repeated using heavy creped paper Ref. No. 617 supplied by Eaton-Dikeman Co. and having a basis weight of 100 lbs. was coated with 203 mg. methyl cellulose deposited from a 1% aqueous solution.

When tested the first drop of filtrate appeared in 30 seconds, with a steady stream developing in 90 seconds. Filtering was completed in 8 minutes. The coffee was excellent.

The process of this invention is not to be confused with the introduction of a water soluble material in the paper pulp beater so as to render the resulting paper waterproof. Also the product of this invention is not to be confused with filters using soluble binders and whose porosity is not affected by the binder. The filter of this invention is provided with a temporarily impervious coating.

Instead of a porous filter paper, a porous finely woven cloth, finely perforated metal or synthetic resin sheeting or a matting of cotton, glass or other filters may be employed. If metal is employed, I prefer to use a thin perf rated aluminum foil so that a low cost disposable product is obtained.

It is to be understood that while described generally as a filter media intended primarily for the brewing of coffee it may also be used for the preparati n of tea, as shown by Example 10, r ther filtrates containing a water soluble extract.

In accordance with the patent statutes, I have set forth in the specification and more particularly in Example 1, the best mode presently contemplated for carrying out the invention. It will be understood that this best mode and other embodiments set forth herein are only illustrative of the invention and that obvious changes may be made within the scope of the invention as defined by the following claims without departing from the basic ideas.

WHAT I CLAIM IS:—

1. A filter medium for use in brewing beverages characterized by said filter medium being substantially non-porous until said filter is subjected to the action of the brewed beverage.

2. The method of brewing coffee comprising the steps of adding comminuted coffee bean to a container including a filter member of Claim 1 coated with a thin layer of an edible water soluble agent so that said filter member is non-porous, adding hot water to said container, dissolving a water soluble constituent from said coffee bean, dissolving said water soluble agent so as to render said filter member porous, and collecting the resulting filtrate.

3. A filter member of Claim 1 comprising a normally porous sheet coated with a thin layer of an edible water soluble material.

4. A filter member of Claim 1 comprising a normally porous sheet having its exposed surfaces coated with a thin layer of an edible water soluble material.

5. A filter member of Claim 1 comprising a thin normally porous sheet coated with a plurality of distinct layers of edible water soluble materials, said layers being composed of materials of unlike solubilities.

6. The filter member of Claim 5 wherein one of said layers is methyl cellulose and another is guar gum.

7. The filter medium of Claim 1 comprising a porous membrane impregnated with an edible water soluble material so as to render said membrane temporarily non-porous.

8. The filter medium of Claim 1 comprising a porous filter paper impregnated with methyl cellulose so as to render said paper non-porous until said methyl cellulose is dissolved.

9. The filter medium of Claim 1 comprising a porous filter paper sheet impregnated with sodium carboxy methyl cellulose so as to render said paper non-porous until said

sodium carboxy methyl cellulose is dissolved.

10. The filter medium of Claim 1 comprising a porous filter paper sheet impregnated with guar gum so as to render said paper non-porous until said guar gum is dissolved.

11. The filter medium of Claim 1 comprising a porous filter paper sheet impregnated with polyvinyl alcohol so as to render said paper non-porous until said polyvinyl alcohol is dissolved.

12. The filter medium of Claim 1 comprising a porous filter paper sheet impregnated with a water soluble casein so as to render said paper non-porous until said casein is dissolved.

13. The filter medium of Claim 1 comprising a fibrous paper having a porous portion and a compacted surface portion, said surface portion being characterized by being non-porous until wet with water.

14. The process for making the filter medium of Claim 1 comprising subjecting a porous fibrous paper to repeated blows of hard members so as to render the surface portion temporarily non-porous.

15. The process for making the filter medium of Claim 1 having a surface portion which is non-porous until wet, comprising pressing the surface of a fibrous paper while in a damp condition so as to compress said fibres so as to close the surface pores without substantially changing the bulking factor of the entire sheet.

16. The process of making the filter medium of Claim 1 including the steps of making a highly porous fibrous filter paper temporarily non-porous by mechanically polishing the surface so as to close surface pores of said paper.

17. The porous filter medium of Claim 1 which is coated with an edible water soluble material containing a minor proportion of eggshell in finely divided form.

18. The porous filter medium of Claim 1 which is coated with an edible water soluble material containing a minor proportion of chicory.

19. A filter medium for use in brewing beverages, substantially as described with reference to the accompanying drawing.

20. A method of brewing coffee substantially as described.

For the Applicant,
GEORGE FUERY & CO.,
Chartered Patent Agents,
Newhall Chambers, 8, Newhall Street,
Birmingham 3.

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1 SHEET

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale

FIG. 1.

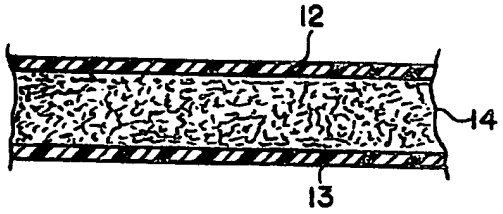

FIG. 2.

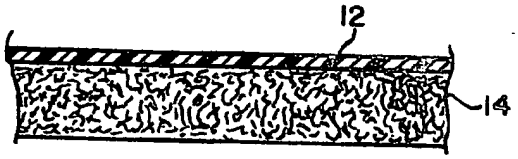

FIG. 3.

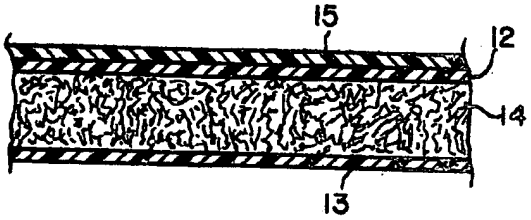

FIG. 4.